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Stability of Personality Trait Rating Factors Obtained Under Diverse Conditions

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By Ernest C. Tupes
And Raymond C. Christal

PERSONNEL LABORATORY
WRIGHT AIR DEVELOPMENT CENTER
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STABILITY OF PERSONALITY TRAIT RATING FACTORS OBTAINED UNDER DIVERSE CONDITIONS

By Ernest C. Tupes
And Raymond C. Christal

Project 7719, Task 17109

Personnel Laboratory
WRIGHT AIR DEVELOPMENT CENTER
AIR RESEARCH AND DEVELOPMENT COMMAND
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Lackland Air Force Base, Texas

ABSTRACT

Peer ratings by officer candidates on specific personality traits have been shown to be predictive of later officer performance. The present study investigated personality trait ratings to determine their factorial structure and the extent to which the factors remained constant in spite of differences in samples, raters, lengths of acquaintanceship, and rating situation. Six intercorrelation matrices were factored and the resulting factors rotated to orthogonal simple structure.

Five clearly defined personality factors were found in each analysis which remained relatively invariant through all analyses. The factors were identified as Surgency, Agreeableness, Dependability, Emotional Stability, and Culture. It was concluded that the factor structure of personality trait ratings is sufficiently invariant that such trait ratings may be regarded as adequate criteria for the study of personality differences and for test development purposes.

PUBLICATION REVIEW

This report has been reviewed and is approved by:

Myron F. Barlow, Col USAF, Chief
Personnel Laboratory

A. Carp, Technical Director
Personnel Laboratory

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STABILITY OF PERSONALITY TRAIT RATING FACTORS OBTAINED UNDER DIVERSE CONDITIONS*

INTRODUCTION

Since World War II there have been numerous studies concerned with peer ratings. Undoubtedly one of the stimulants for this research has been the growing body of evidence that such ratings are predictive of supervisory ratings which are used so often as criterion measures. All three of the service academies currently employ a form of peer rating which has been found to be related to later officer effectiveness. These ratings are rather global in nature, requiring cadets to rate fellow cadets on officer potential or aptitude for commissioned service.

Other studies have shown that peer ratings on more specific personality traits are also valid predictors of later criteria. In fact, ratings on specific traits can be combined, using conventional weighting techniques, to grant more validity than is obtained using global ratings (6).

Unfortunately, the domain of independent personality traits which can be reliably rated is not clearly defined. Cattell (1, 2, 3,) has published two analyses of men and one of women, each based on ratings of 35 personality traits selected to represent the entire personality area. In general, he found what may have been the same or similar factors emerging from the three analyses. Fiske (4) analyzed ratings of 22 similar traits using beginning graduate students in clinical psychology for his sample. He found that ratings by the students themselves, by their peers, and by clinical psychologists, yielded similar factors. When one compares the factors isolated by Fiske with those defined by Cattell, he finds himself in a rather difficult situation. Cattell reports 11 or 12 relatively weak factors in each of his analyses, while Fiske reports only five somewhat stronger factors. Some similarities can be noted between the Cattell and Fiske factors, but it is difficult to tell whether the differences observed represent divergent extraction and rotational philosophies, the nature of the samples rated, the nature of the rater groups, or the omission of 13 of the trait variables from the Fiske study.

The present study was designed to help clarify the personality trait-rating domain. The goal was to isolate meaningful and relatively independent trait-rating factors which are universal enough to appear in a variety of samples and which are not unduly sensitive to the rating conditions or situations.

*Manuscript released by the authors for publication as a WADC Technical Note in May 1958. It is based on a paper presented at the annual meeting of the Midwestern Psychological Association in Detroit, 2 May 1958.

METHOD

Six intercorrelation matrices were factored and rotated orthogonally to simple structure. The trait variables were selected from among the 35 developed by Cattell (2). Each trait is bipolar, with each pole defined by a short group of adjectives or phrases.

Three of the intercorrelation matrices were based on Air Force Officer Candidate School subjects, who rated each other in various sized groups. One analysis is a rerotation of an analysis published by Cattell in 1947, in which the subjects and raters were college students. The last two analyses are based on two of Fiske's intercorrelation matrices of ratings of first year graduate students in clinical psychology. In the first of these, ratings were obtained from peers; in the second, ratings were obtained from experienced clinicians.

These groups of subjects and raters are described in detail in Appendix B. Briefly, they differ in length of acquaintanceship from three days to nearly a year; in kind of acquaintanceship, from an assessment program to a military training course to a fraternity house situation; in type of subject, from airmen with a high school education to first year graduate students; and in type of rater from very naive persons to clinical psychologists with years of experience in the evaluation of personality.

The intercorrelation matrix based on the large sample of 700 Officer Candidates and Cattell's matrix were factored by extracting eight factors by the complete centroid method. The other matrices were analyzed by extracting five multiple group factors, orthogonalizing them, and then extracting three additional centroid factors. Each factor matrix was then rotated graphically to orthogonal simple structure.

None of these analyses was carried out blind, nor were they made independently of one another. The goal was to rotate the separate factor matrices into similar structures while at the same time following accepted principles of rotation and arriving at reasonably good simple structure.

RESULTS

Appendix A gives a list of the trait variables; Appendix B descriptions of the samples and rating procedures; and Appendix C the results of the factor analyses.[1]

It should be reemphasized that the purpose of this study was to identify relatively independent and meaningful trait rating factors which emerge in a variety of samples and which are not unduly influenced by the rating conditions or situations. The five factors listed in Appendix C seem to meet these criteria.

In each of the analyses using Fiske's data, all but the five factors reported were residualized. In each of the three analyses using the OCS samples, two of the eight factors were residualized and a sixth very weak factor was defined by performance criteria not considered to be a part of the basic study. In the analysis using Cattell's data, two factors were residualized. One factor involving primarily an intelligence test was defined but is not reported here.

It is apparent from the tables in Appendix C, that the five factors differ only slightly from analysis to analysis. In nearly all cases, the major determiners (variables with loadings above .5) are the same, and in general even the minor determiners (variables with loadings between .3 and .5) are the same.

The nature of each factor appears reasonably clear.

The first factor seems to be that labeled by French (5) as Surgency. It is highly loaded by the traits Assertiveness, Frankness, Energetic, Talkativeness, Adventurousness, and Sociability.

Factor II is defined by Cooperativeness, Attentiveness, Goodnature, Mild-Manner, Absence of Jealousy, and Emotional Maturity. It corresponds very closely to the factor labeled Agreeableness by French.

[1]Only the loadings of the variables which correlated .30 or higher with each factor are listed. The complete sets of rotated and centroid loadings, communalities, and intercorrelations may be obtained by writing the authors. The present report represents only part of a larger study which will include factor analyses of personality ratings on children, women, and men of lower intelligence than those in the samples reported here. The complete study is planned as a monograph which will include all data needed to properly evaluate the adequacy of the factor analyses.

Factor III has its highest loadings on the traits Responsibility, Conscientiousness, Orderliness, and Conventionality. This factor in many respects is like that labeled by French as Dependability or by Fiske as Conformity.

Factor IV appears to be Emotional Stability. It is defined by Calmness, Placidity, Poise, and Lack of Neurotic or Hypochondriacal Tendencies. French lists the inverse of this factor as Emotionality.

Factor V is defined by Artistic, Cultured, Imaginative, and Polished, and appears to be the factor labeled by French as Culture.

CONCLUSIONS

The results of these analyses clearly indicate that differences in samples, situations, and lengths of acquaintanceship seem to have little effect on the factor structure underlying ratings of personality traits. We are not yet ready to suggest that these five factors are the primary personality factors and certainly they are not the only ones. Nor would we want to assert that our factor structure is the only one. Other investigators with the same data might arrive at a recurrent structure quite different from ours. It is also undoubtedly true that studies can be designed and rating situations set up so that other and different factors would emerge. However, it does seem fairly safe to conclude that the factor structure of personality trait ratings is sufficiently invariant so that such ratings may be regarded as useful in the study of individual differences in personality, and in the prediction of future behavior. If peer ratings are obtained on personality trait ratings within any convenient rating group, relationships found between those ratings and other measures may be generalized to other populations with some degree of safety. Thus, it appears, trait ratings may be used as the basis for studies designed to identify general laws and dynamics of interpersonal behavior, and as criteria for the development of personality tests which, when sufficiently valid, might be used instead of the trait ratings in situations (e.g., selection) where such ratings are difficult or impossible to obtain.

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APPENDIX A

THE PERSONALITY TRAIT RATING VARIABLES

Below are listed the rating variables of the various analyses, followed by a notation indicating in which analyses each variable appears. The rating definitions of the variables used in the OCS and Cattell studies may be found in articles by Cattell (2) and Tupes (6). Definitions of variables used in the Fiske studies appear in an article by Fiske (4).

Trait names shown under B are at the socially approved end of each bipolar continuum. In obtaining the ratings in each study, socially approved poles of the traits appeared alternately at the right and left of the rating scale. Before any factors were extracted, each intercorrelation matrix was reflected so that the socially approved pole of each trait is associated with a high score.

	A	B	ANALYSES
1.	Obstructiveness	Readiness to Cooperate	All
2.	Changeable	Emotionally Stable	All
3.	Submissive	Assertive, Self-Assured	All
4.	Frivolous	Responsible	All
5.	Cool, Aloof	Attentive to People	All
6.	Easily Upset	Unshakable Poise, Tough	All
7.	Languid, Slow	Energetic, Alert	All
8.	Boorish	Inteilectual, Cultured	All
9.	Suspicious	Trustful	All

	A	B	ANALYSES
10.	Spiteful, Grasping, Critical	Goodnatured, Easygoing	All
11.	Emotional	Calm, Phlegmatic	OCS & Cattell
12.	Hypochondriacal	Not so	OCS & Cattell
13.	Self-willed, Egotistic	Mild, Self-effacing	OCS & Cattell
14.	Silent,Introspective	Talkative	All
15.	Quitting, Fickle	Persevering, Determined	OCS & Cattell
16.	Cautious, Retiring, Timid	Adventurous, Bold	All
17.	Kindly, Soft-hearted	Hard, Stern	OCS & Cattell
18.	Relaxed, Indolent	Insistently Orderly	OCS & Cattell
19.	Clumsy, Awkward	Polished	All
20.	Prone to Jealousy	Not Prone to Jealousy	OCS & Cattell
21.	Rigid	Adaptable	All
22.	Demanding, Impatient	Emotionally Mature	OCS & Cattell
23.	Unconventional, Eccentric	Conventional	OCS & Cattell
24.	Worrying, Anxious	Placid	All
25.	Somewhat Unscrupulous	Conscientious	All
26.	Neurotic Fatigue	Absence of Neurotic Fatigue	OCS & Cattell
27.	Lacking Artistic Feeling	Esthetically Fastidious	OCS & Cattell
28.	Secretive, Reserved	Frank, Expressive	All
29.	Self-contained	Gregarious, Sociable	OCS & Cattell
30.	Dependent,Immature	Independent-minded	All

	A		ANALYSES
31.	Attention Getting	Self Sufficient	Cattell
32.	Depressed	Cheerful	Cattell & Fiske
33.	Shy, Bashful	Composed	Cattell
34.	Practical, Logical	Imaginative	Cattell & Fiske
35.	Slight Interest in Opposite Sex	Marked Interest in O.S.	Cattell & Fiske
36.	A.C.E. Intelligence Test (Low to High Score)		Cattell
37.	Dependent	Self Sufficient	Fiske

(Note: Nos. 31 and 37 are defined quite differently in Cattell's and Fiske's analyses, although their labels appear similar)

APPENDIX B: DESCRIPTION OF SAMPLES

Study 1.

The subjects were 790 male graduates of OCS Classes 49B, 50A, 50B, 50C, 51B, and 51D. The earliest class, 49B, was graduated in December 1949; the latest, 51D, was graduated in December 1951. All candidates in each class had been selected from a much larger number of applicants (selection ratio about ten applicants for each vacancy) on the basis of a board interview, a biographical inventory designed to measure leadership characteristics, and differential credit for completion of more than the required minimum of two years of college. For applicants on active duty in an enlisted status, an evaluation form completed by the applicant's commanding officer was also considered. The average age was 23.6 years, with a standard deviation of 1.5 and a range of from 20.5 to 26.5 years. The average education was 3.6 years of college, with a standard deviation of 0.6 and a range of from 2 to 6 years. Distributions on both variables were decidedly skewed toward the lower end. Slightly over half of each class came from an enlisted status, with the others selected for OCS directly from civilian life.

Each OCS class was divided at the start of training into flights of from 25 to 30 candidates each. Each flight lived together in one barrack, ate as a flight, and attended classes and drill as a flight. In fact, nearly all of

each candidate's time was spent with his flight and he soon became intimately acquainted with each of his fellow flight members. It was the well-organized OCS flight which constituted the rating group in the present study. Each candidate rated all his fellow flight members and was in turn rated by all his fellow flight members on each personality trait. Each rater was required to pick one-third of the group as best described by the definition at each end of each bipolar trait.

Lengths of acquaintanceship at time of rating varied from as little as three weeks for one class to one year in another (this class rated each other six months after graduation from OCS at the end of an on-the-job training period at Lackland Air Force Base).

Product-moment intercorrelation matrices of the 30 traits were computed for each class separately. A final matrix was then obtained by taking the median correlation between each pair of traits in the separate class matrices. This matrix was used in the factor analysis of this sample.

Study 2

The subjects were 125 male officer candidates in OCS Class 55B, whose ages ranged from 20 1/2 through 27. A little more than half had no college training; about a fifth had some college; and about a fifth were college graduates. All had some previous Air Force enlisted service ranging from one year to 7 with a median of 2 1/2 years. The majority were planning on an Air Force career and all had been required to sign a contract for three years of commissioned service after graduation from OCS. All had been screened on a measure of general learning ability--the Officer Quality composite of the Air Force Officer Qualifying Test. Eighty-five per cent of the class had OQ scores as high as the upper 10% of the general population of young males and as the upper 40% of college freshmen.

Ratings were obtained at the end of a three-day assessment program just prior to the start of OCS. Rating groups consisted of twelve candidates, six of whom had observed each other in an intensive series of group and individual performance tests, and six of whom had only shared a barrack floor and dining table with the other six. Each rater was required to pick the four subjects who were best described by each end of the bipolar trait.

Study 3

These are the same subjects who were used in Study 2. At the end of the assessment, the groups were re-formed into OCS flights of from 15 to 20 candidates each. No two flight members had been members of the same

assessment group. Near the end of the six-months OCS course, members of each flight rated each other on the 30 traits. Raters were asked to pick the third who were best described by each end of each bipolar trait. These ratings, although based on the same subjects, were entirely independent of the ratings analyzed in Study 2.

Study 4

Subjects were 133 male university students with an average age of 20 years. Some were returning veterans. Ratings were obtained in groups of 17 men, all of whom lived together in fraternity houses or dormitories. Each rater rated all members of his group on each trait as below average, average, or above average on each trait, with a suggested distribution of 1/4, 1/2, and 1/4 for the three categories. For a complete description of this sample see Cattell (2).

Study 5

The subjects were 128 male graduate students in clinical psychology who participated in an intensive assessment program during the summer before they started their graduate training. Their median age was 26, nearly all were veterans, and nearly all had World War II experience as military psychologists. During the week-long assessment, they ate, roomed, and took their recreation together. Twenty-four trainees were assessed each week and were split arbitrarily into groups of four who participated in a series of situational tests. At the end of the week, each subject rated himself and the other three members of his group on a series of variables, including 22 bipolar personality traits. Ratings were made on an eight-point scale. The three ratings made on each subject by his three teammates were summed to obtain the rating scores used in this study. For a complete description of the sample, the variables, and the rating procedure, see Fiske (4).

Study 6

These subjects were the same as those of Study 5. The same rating variables and rating scales were used. The raters were three assessment staff members assigned to each group of four subjects, and the rating scores were the sum of the ratings made by each staff member. Each staff member was a clinical psychologist (a few were psychiatrists) with years of experience. The raters had not only intensively observed each subject during a period of one week but in addition had the results of ten objective tests, four projective tests, a biographical inventory, an autobiography, and the write-ups of three interviews. The staff ratings were made without knowledge of the teammates' ratings.

APPENDIX C: LOADINGS OF VARIABLES DEFINING FIVE FACTORS

Factor I

Variable	OCS 790 Case Sample	OCS 55B 3-Day	OCS 55B 6-Month	Cattell Sample	Fiske Teammates	Fiske Staff
#14. Talkativeness	.82	.74	.65	.74	.88	.86
#28. Frankness	.82	.73	.75	.75	.75	.46
#16. Adventurousness	.82	.74	.81	.63	.70	.57
# 3. Assertiveness	.72	.65	.83	.59	.67	.77
#29. Sociability	.69	.66	.78	.70	x	x
# 7. Energetic	.68	.70	.69	.53	.84	.71
#32. Cheerfulness	x	x	x	.42	.72	.61
#35. Interest in Opposite Sex	x	x	x	.50	.65	.44
# 5. Attentive to People	.52	.42	.31	.55	.48	.61
#23. Conventionality	-.40	-.56	-.36	-.38	x	x
#30. Independent Minded	.36	.56	.63	.03	.26	.26
#21. Adaptability	.20	.18	.40	.34	.33	.27
# 6. Poised	.32	.50	.49	-.01	-.02	.25

Includes all variables with loadings of .30 or higher on at least two analyses. Variable Nos. 1, 4, 11, 24, 26 and 31 had loadings above .30 on one analysis.

Variables not rated in any study are indicated by x's.

Loadings of Variables Defining Factor II

Variable	OCS 790 Case Sample	OCS 55B 3-Day	OCS 55B 6-Month	Cattell Sample	Fiske Teammates	Fiske Staff
#10. Goodnatured	.94	.74	.79	.76	.74	.77
#20. Lack of Jealousy	.75	.69	.77	.62	x	x
#22. Emotionally Mature	.77	.64	.82	72	x	x
#13. [illegible]dness	.74	.58	.73	.62	x	x
# 1. Cooperation	.68	.46	.68	.55	.60	.68
# 9. Trustfulness	.57	.53	.67	.61	.63	.57
#21. Adaptability	.59	.44	.68	.63	.40	.66
#17. Hard, Stern	-.60	-.45	-.50	-.60	x	x
# 5. Attentive to People	.66	.54	.48	.37	.41	.47
# 2. Emotionally Stable	.50	.59	.60	.31	.44	.21
#25. Conscientious	.51	.46	.56	.41	.29	.45
# 3. Assertiveness	-.38	-.40	-.32	-.52	-.37	-.45
#11. Calmness	.44	.30	.56	.24	x	x
#32. Cheerfulness	x	x	x	.32	.29	.43
#24. Placid	.30	.32	.50	.11	.45	.30
#26. Not Neurotic	.35	.11	.43	.20	x	x
# 4. Responsibility	.27	.49	.40	.29	.00	.18
#12. Not Hypochondriacal	.37	.04	.52	.15	x	x

Includes all variables with loadings of .30 or higher in at least two analyses. Variable Nos. 15, 19, 28 and 31 had loadings above .30 on one analysis.

Variables not rated in any study are indicated by x's

Loadings of Variables Defining Factor III

Variable	OCS 790 Case Sample	OCS 55B 3-Day	OCS 55B 6-Month	Cattell Sample	Fiske Teammates	Fiske Staff
#18. Orderliness	.69	.38	.62	.66	x	x
# 4. Responsibility	.59	.44	.61	.67	.69	.74
#25. Conscientiousness	.54	.48	.56	.53	.56	.74
#15. Persevering	.58	.34	.43	.56	x	x
#23. Conventionality	.59	.34	.58	.40	x	x
# 1. Cooperation	.40	.49	.48	.43	.18	.32
#13. Mildness	.19	.12	.43	.40	x	x
#29. Sociability	-.38	-.43	-.16	-.41	x	x
#35. Interest in Opposite Sex	x	x	x	-.19	-.43	-.36
# 2. Emotionally Stable	.29	.33	.32	.37	.42	.35
#16. Adventurousness	-.35	-.11	-.28	-.57	-.36	.08

Includes all variables with loadings of .30 or higher in at least two analyses. Variable Nos. 8, 11, 14, 22, and 28 had loadirgs above .30 on one analysis.

Variables not rated in any study are indicated by x's.

Loadings of Variables Defining Factor IV

Variable	OCS 790 Case Sample	OCS 55B 3-Day	OCS 55B 6-Month	Cattell Sample	Fiske Teammates	Fiske Staff
#26. Not Neurotic	.67	.74	.53	.74	x	x
#24. Placid	.71	.70	.60	.60	.67	.78
# 6. Poised	.67	.54	.62	.69	.69	.80
#12. Not Hypochondriacal	.69	.60	.59	.50	x	x
#11. Calmness	.61	.52	.61	.38	x	x
#37. Self Sufficient	x	x	x	x	.42	.56
#15. Persevering	.44	.49	.44	.22	x	x
# 2. Emotionally Stable	.60	.39	.55	.27	.22	.45
#20. Not Jealous	.47	.32	.36	.46	x	x
# 9. Trustfulness	.58	.46	.45	.37	.12	.28
#30. Independent Minded	.54	.40	.47	.34	.32	.28
#17. Hard, Stern	.35	.27	.45	.28	x	x
#21. Adaptability	.40	.38	.27	.29	.31	.31
#22. Emotionally Matur :	.40	.22	.19	.24	x	x

Includes all variables with loadings of .30 or higher on at least two analyses. Variable Nos. 1, 19, 31, and 34 had loadings above .30 on one analysis.

Variables not rated in any study are indicated by 'x's

Loadings of Variables Defining Factor V

Variable	Analysis: OCS 790 Case Sample	OCS 55B 3-Day	OCS 55B 6-Month	Cattell Sample	Fiske Teammates	Fiske Staff
#27. Artistic	.78	.79	.83	.45	x	x
# 8. Culture	.79	.78	.72	.66	.60	.82
#19. Polished	.76	.78	.81	.62	.58	.41
#34. Imaginative	x	x	x	.26	.68	.73
#30. Independent Minded	.51	.37	.35	.62	.42	.64
#18. Orderliness	.28	.55	.49	.38	x	x
#15. Persevering	.42	.21	.43	.48	x	x
# 7. Energetic	.47	.25	.35	.39	.08	.13
# 6. Poised	.38	.23	.30	.32	.10	.12
# 4. Responsible	.33	.39	.35	.19	.04	.16
#25. Conscientious	.29	.44	.40	.21	.20	.06
#21. Adaptable	.03	-.14	.07	-.14	.46	.38

Includes all variables with loadings of .30 or higher in at least two analyses. Eight other variables (Nos. 1, 2, 5, 11, 14, 16, 23 and 33) had loadings above .30 on one analysis.

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